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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
JOHNSON et al.

Examiner: RINEHART, K.

Art Unit: 3749

Confirmation No.: 3654

Serial No.: 10/622,677

Filed: July 18, 2003

Atty. Docket No.: 3791-13-CON

FOR: LOW SULFUR COAL ADDITIVE FOR IMPROVED FURNACE OPERATION

CERTIFICATE OF TRANSMISSION UNDER 37 CFR 1.8

I HEREBY CERTIFY THAT THE ATTACHED CORRESPONDENCE IS BEING FACSIMILE TRANSMITTED TO THE UNITED STATES PATENT AND TRADEMARK OFFICE VIA FACSIMILE NO. (571) 273-8300, ON: March 3, 2006.

RESPONSE TO RESTRICTION REQUIREMENT (6 PAGES).

Claudia Mendoza

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: JOHNSON et al.
Serial No.: 10/622,677
Filed: July 18, 2003
Atty. File No.: 3791-13-CON
For: "LOW SULFUR COAL ADDITIVE FOR IMPROVED FURNACE OPERATION"

Group Art Unit: 3749
Examiner: Rinehart, Kenneth
Confirmation No.:

RESPONSE TO RESTRICTION REQUIREMENT

CERTIFICATE OF MAILING

I HEREBY CERTIFY THAT this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage via first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on: March 3, 2006

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Commissioner for Patents
P.O. Box 1450
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Dear Sir:

In an Office Action dated February 3, 2006, the Examiner issued a Restriction Requirement with regard to the above-identified patent application. Generally, the Examiner indicated that Claims 24-26, 33-36, 44-67, 87, 88, 89, 109, 110, 131, 132, and 137 (Group I) and Claims 68-86, 90-108, 111-130, 133, and 134-136 (Group II) were distinct inventions. The Group I claims use the terminology of the claims in U.S. Patent 6,484,651 to Shepard, Jr., et al. ("the Shepard Patent"). The Group II claims use the terminology expressly set forth in the Specification of the above application.

Applicants respectfully traverse the Examiner's requirement.

Independent Claim 24, which is exemplary of Group I, states:

24. A method of operating a solid fuel fired boiler, comprising:

introducing a solid fuel into at least one of a slag-type furnace and a wet-bottom boiler;

introducing an iron-bearing material into the at least one of a slag-type furnace and a wet-bottom boiler, wherein the iron bearing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and

at least partially combusting the solid fuel to produce an ash slag, wherein, in the at least partially combusting step, at least one of the following is true:

(i) at least a portion of the iron bearing material fluxes the ash slag to produce a composite ash slag *having at least one ash fusion temperature characteristic selected from*

> *the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone*; and
>
> (ii) at least a portion of the iron bearing material fluxes the ash slag to produce a composite ash slag having a melting point less than the melting point of ash slag produced from the combustion of the solid fuel alone.

Independent Claims 68 and 90, which are exemplary of Group II, state:

> 68. A method of operating a solid fuel fired boiler, comprising:
>
> introducing a solid fuel into a wet-bottom boiler;
>
> introducing an iron-bearing material into the wet-bottom boiler, wherein the iron-bearing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and
>
> at least partially combusting the solid fuel to produce an ash slag, wherein at least a portion of the iron-bearing material fluxes the ash slag to produce a composite ash slag having a melting temperature less than the melting temperature of ash slag produced from the combustion of the solid fuel alone.

> 90. A method of operating a solid fuel fired boiler, comprising:
>
> introducing a solid fuel into a wet-bottom boiler;
>
> introducing an iron-bearing material into the wet-bottom boiler, wherein the iron-bearing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and
>
> at least partially combusting the solid fuel to produce an ash slag, wherein at least a portion of the iron-bearing material fluxes the ash slag to produce a composite ash slag *having a viscosity in the boiler less than the viscosity in the boiler of an ash slag produced from the combustion of the solid fuel alone.*

The alleged inventions are the same and, therefore, related. The inventions are used together and have identical modes of operation, functions, and effects. As set forth in ¶9 of the Declaration of Ramon Bisque under 37 CFR§1.132, filed July 29, 2004, ("Bisque Declaration"), the inventions of Group I and II each disclose the combustion of the same fuel (a solid fuel) in the same type of combustion chamber in the presence of the same iron-bearing material additive under the same temperature regime. In the preferred configuration, the fuel is a low sulfur western or eastern coal (*see, e.g.*, Provisional Application at pages 1 and 3; Subject Application at Figure 2, page 2, lines 15-17, page 3, lines 9-12, page 4, lines 3-4 and 7-9, and page 6, lines 4-5; and Shepard Patent at col. 1, line 62-col. 2, line 3, col. 3, lines 26-34 and 55-57and Fuels 3 and 4). The combustion chamber is a solid fuel-fired boiler, such as a "slag tap" or "wet bottom" boiler (e.g., a cyclone-type boiler) (*see, e.g.*, Provisional Application at pages 1-5 and 7-8; Subject Application at Figure 1, page 1, lines

18-26, page 5, lines 16-17, page 6, lines 4-5 and 15-18, and page 18, lines 12-13; and Shepard Patent at col. 2, lines 7-8, col. 4, lines 7-10). The iron-bearing material is mill scale from steel production or dust from blast furnace gas cleaning equipment (*see, e.g.*, Provisional Application at pages 4 and 6; Subject Application at page 12, lines 7-12; and Shepard Patent at col. 4, lines 15-16, col. 8, lines 4-5). The additive is used for the same purpose, namely to flux the ash slag. The purpose of fluxing the ash slag is to lower the ash slag viscosity, thereby facilitating flow of the ash slag from the boiler. The temperature regime is that necessary to combust the solid fuel and melt the ash content of the fuel to form slag. (*see, e.g.*, Provisional Application at pages 1-5 and 7-8; Subject Application at page 2, lines 14-15, page 6, lines 4-5 and lines 15-18, Figures 7-8 and page 20, lines 1-21; and Shepard Patent at col. 2, lines 4-50, col. 5, lines 10-50). *In chemistry, it is elementary that the use of the same reactants under the same reaction conditions in the same reactor will produce the same results.*

The primary difference between the Groups is a difference in the italicized terminology used to describe the *same basic reaction* in the boiler. Group I, in alternative (i), requires the additive to flux the ash slag to produce a composite ash slag *having at least one ash fusion temperature (AFT) characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone.* Group II requires the additive to flux the ash slag to produce a composite ash slag having a melting temperature less than the melting temperature of ash slag produced from the combustion of the solid fuel alone (claim 68) (which is the alternative (ii) of claim 24) or *a viscosity in the boiler less than the viscosity in the boiler of an ash slag produced from the combustion of the solid fuel alone* (claim 90).

The AFT characteristics of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature represent a *continuum* of constituent melting points leading to the complete melting of the ash. (Bisque Declaration at ¶13) The characteristics are arbitrary and established by subjective visual observation. (Bisque Declaration at ¶13) According to pages 20-5 through 20-7 of *"Steam/its generation and use"*, by Babcock & Wilcox (1972) ("the Babcock & Wilcox Article" attached to the Bisque Declaration as Exhibit "A"), the AFT properties are determined as part of the ASTM Standard D 1857, *Fusibility of Coal and Coke Ash*". According

to the standard, an ash sample is prepared by burning coal under oxidizing conditions at temperatures of 1470 to 1650°F. The ash is pressed into a mold to form a triangular pyramid cone 0.75 in. in height with a 0.25 in. triangular base. The cone is heated in a furnace at a controlled rate to provide a temperature increase of 15°F per minute. The initial deformation temperature (IT or ID) refers to the temperature at which the tip of the pyramid begins to fuse or show signs of deformation. The softening temperature (ST) is the temperature at which the sample has deformed to a spherical shape where the height of the cone is equal to the width at the base (H=W). The softening temperature is commonly referred to as the fusion temperature. The hemispherical temperature (HT) is the temperature at which the cone has fused down to a hemispherical lump and the height equals one half the width of the base (H=1/2W). The fluid temperature (FT) is the temperature at which the ash cone has melted to a nearly flat layer with a maximum height of 0.0625 in. (Bisque Declaration at ¶14)

It is well known that each of the AFT characteristics, namely IT, ST, HT, and FT, represent a melting point of one or more ash constituents. Regarding the relationship between the AFT properties and the melting point of the ash, the Babcock & Wilcox Article states:

> The gradual deformation of the ash cone is generally considered to result from differences in melting characteristics of the various ash constituents. As the temperature of the sample is increased, compounds with lowest melting temperature begin to melt, causing the initial deformation. As the temperature continues to increase, more of the compounds melt and the degree of deformation proceeds to the softening and hemispherical stages. The process continues until the temperature is higher than the melting point of most of the ash constituents and the fluid stage is reached.

(The Babcock & Wilcox Article at page 20-6.) (Bisque Declaration at ¶15)

For at least these reasons at the times that the Subject and Provisional Applications were filed, the Bisque Declaration concludes that one of ordinary skill in the art would understand the phrase, "melting temperature of the ash" (as used in the Subject Application and Provisional Application), to refer to the last (or highest) of a sequence of melting points for differing ash constituents and require that each of the lower melting point constituents have melted. The melting temperature of the ash is therefore synonymous with the fluid temperature AFT characteristic. (Bisque Declaration at ¶16).

Moreover, the use of the term "flux" in the Group I and II claims establish that the differences in terminology effectively describe the same phenomenon. According to *Hawley's Condensed Chemical Dictionary*, "flux" is defined as "[a] substance that promotes fusing of minerals or metals or prevents the formation of oxides." It further defines "fuse" as "[o]f a solid, to *melt*, e.g., a fused salt." (Emphasis supplied.) The terms "flux" and "fuse" in the Group I and II claims suggest to one of ordinary skill in the art that the various melting points of the ash constituents, denoted by the AFT properties, are lowered by the iron-bearing additive claimed by both Groups. (Bisque Declaration at ¶17)

The law is clear that "[w]here the claims of an application define the same essential characteristics of a *single* disclosed embodiment of an invention, restriction therebetween should never be required." MPEP§806.03. "This is because the claims are not directed to distinct inventions; rather they are different definitions of the same disclosed subject matter, varying in breadth or scope of definition." *Id.*

Even though different terms are used for certain aspects of Groups I and II, *identical terms are used by other aspects of Groups I and II.* Alternative (ii) of Independent Claim 24 is substantially identical to independent claims 68 and 134. Independent claim 24 is phrased in a Markush-type structure. According to MPEP§803.02, "[i]f the members of the Markush group are sufficiently few in number or so closely related that a search and examination of the entire claim can be made without serious burden, the examiner *must* examine all the members of the Markush group in the claim on the merits, *even though they are directed to independent and distinct inventions*. (Emphasis added.) Thus, independent claim 24 must be considered generic to the alleged inventions of Group I and Group II. and no restriction requirement is proper.

The restriction requirement is directed to the heart of the requested interference. By finding the two sets of claims to be different inventions, the Examiner is, effectively, rendering a decision that no interferable subject matter exists. For these reasons, Applicant admits that the alleged inventions of Group I and II are not patentably distinct. This concession renders the restriction requirement improper. MPEP§806.04(h)

Notwithstanding the foregoing, Applicants hereby elect to prosecute Group I Claims 24-26, 33-36, 44-67, 87, 88, 89, 109, 110, 131, 132, and 137 in this patent application.

However, Applicants respectfully reserve the right to pursue Group II Claims 111-130, 133, and 134-136 in a subsequent divisional/continuation application.

Respectfully submitted,

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